Full Dimensional Protection

General

One of the effects of the 11 September 2001 attack on America was the increased awareness of the criticality of Full Dimensional Protection not only as a key operational concept for military operations but also as it pertains to the U.S. Homeland.

Full Dimensional Protection is defined in *JV 2020* as the ability of the joint force to protect its personnel and other assets required to decisively execute assigned tasks. Full Dimensional Protection is achieved through the tailored selection and application of multilayered active and passive measures; within the domains of air, land, sea, space and information; across the range of military operations; and with an acceptable level of risk. Army modernization and Transformation includes those key full dimensional protection activities/programs, which provide the tools to commanders as they assess and manage risk.

As our forces operate across the full spectrum of operations, it is crucial that we take all possible measures to protect the force and ensure its survival. **Survivability** also affects the perceptions of our adversaries about their ability to fight and win against U.S. forces. But the survivability of the force must extend beyond combat operations and it must address current and emerging asymmetric threats. As the Army transforms, a key capability of the Objective Force will be to demonstrate to potential adversaries the futility of pursuing asymmetric capabilities. It must ensure U.S. forces retain strategic, operational, and tactical positional advantage over adversaries and can conduct high-tempo, sustainable operations despite the presence, threat, or use of these weapons. Conditions must be established and maintained to ensure the survivability of individuals, units, and supporting infrastructure. Thus, survivability cannot depend on only intrinsic capabilities, but must be a combination of active and passive defensive measures executed by the Objective Force. To meet these challenges, the Army must develop the right capabilities and incorporate new technologies to meet expanding mission requirements and counter emerging threat capabilities (including the asymmetric threat).

The overall goal of Army Transformation is the creation of an Objective Force that can defend the U.S. Homeland and is dominant across the full spectrum of military operations—persuasive in peace, decisive in war, preeminent in any form of conflict. Full Dimensional Protection conserves the force's fighting potential and preserves the capability to deploy, enabling the Army to respond at the decisive time and place. Implementing this fundamental operational concept requires the ability to provide anti-access protection by denying use of airspace, and exerting control over the area of operations to ensure friendly forces maintain freedom of action during deployment, maneuver, and engagement. It also requires capabilities to counter enemy systems used to locate, strike, and destroy friendly forces, key infrastructure

and geopolitical assets (both at home and abroad). Additionally, operational facilities, including civil infrastructure, and forces must be protected from concentrated enemy air, space, ground, and sea attacks; nuclear, biological, and chemical (NBC) weapons; and terrorists.

The Army's Full Dimensional Protection modernization effort is synchronized with *JV 20*, and supports the recommendations of the Defense Planning Guidance and 2001 Quadrennial Defense Report. Our protection capabilities will continue to improve against an expanding threat arsenal, which includes information operations, terrorist attacks and other asymmetric threats (including ballistic missiles, cruise missiles and WMD). The result will be improved freedom of action for friendly forces and better protection at all echelons, both at home and abroad.

This annex focuses on some key elements (Legacy thru Objective) of the Army's Full Dimensional Protection mission area, including Air and Missile Defense (AMD) forces and NBC defense assets. To ensure that the Army is protected throughout the full spectrum of operations, these assets must be responsive, versatile, lethal, deployable and sustainable for the duration of operations.

Air and Missile Defense

Overview

Army Air and Missile Defense forces, together with joint, multinational, and interagency forces, will *dominate*, *control*, and *exploit* the third dimension of the joint battlespace to win across the spectrum of operations.

To appreciate the full scope of this mission, a clear understanding of the terms dominate, control, and exploit is essential.

- **Dominate.** Dominate is defined as prevailing or predominating the airspace. The three tasks associated with dominating the airspace are: to execute Army engagements ensuring interdependent joint force air superiority; to extend defensive counterair range both vertically and horizontally; and to conduct proactive offensive operations. Dominating the third dimension of the joint battlespace serves a twofold purpose: to ensure the Force Commander's vertical and horizontal freedom of maneuver and to render the opposing force incapable of effectively interfering with joint and multinational operations. Dominating the airspace provides full dimensional protection for the force.
- **Control.** Control is defined as exercising, regulating, and governing the Army use of airspace in close coordination with the joint airspace control authority. Airspace control has a single task—to provide positive (vice procedural) coordination, integration, synchronization, and regulation of Army use of the airspace. Control has three purposes. The first is to assure discrimination of all airspace objects, ultimately eliminating the risk of fratricide. The second is to improve force protection for air and ground forces, and the third is to increase the overall effectiveness

of the force. Airspace control is a critical enabler for the joint force in that it fully synchronizes use of the third dimension.

- **Exploit.** Exploit is defined as taking full advantage of all capabilities and/or information derived from AMD or third dimensional C4 and intelligence, surveillance, and reconnaissance (ISR) sources. The two tasks associated with exploiting the airspace are to provide situational awareness and understanding to the force and to provide focused early warning to military forces and civilian authorities. The purpose of exploiting information superiority is three fold: to enable opportunities for commanders to set the OPTEMPO, to optimize the execution of Army, joint, and multinational operations, and to deny the enemy an information advantage. Exploiting the airspace enables not only airspace information superiority, but overall information superiority.

Role in the Army

AMD forces will play critical roles in supporting Army operations. These roles include:

- Enabling and sustaining information superiority by denying the collection of aerial intelligence and protecting friendly C4ISR assets.
- Providing situational awareness and understanding to commanders at all levels, enabling them to effectively plan and execute warfighting operations.
- Protecting military forces, critical assets, geopolitical infrastructure, and civilian populations in theater, regional, and homeland areas against TBMs, cruise missiles, unmanned aerial vehicles, and potentially rockets, artillery, and mortars.
- Supporting offensive operations by providing proactive cross-pillar support.
- Providing positive control of the Army airspace to eliminate fratricide and achieve dynamic use of the airspace.

AMD elements will be employed in the Legacy, Interim and Objective Forces to execute offensive, defensive, stability, and support operations at the tactical through strategic levels of warfare.

The **Legacy Force** must respond when, where, and as needed as the Army executes Transformation. As the Army addresses AMD transformation, existing systems like Patriot, Stinger, Avenger, AMDPCS, FAAD C2, Sentinel, and M6 Linebacker must be improved, selectively recapitalized and sustained until they are phased out to ensure that they remain fully mission-capable and combat-effective in support of the Army's interim and objective forces. Robust recapitalization programs are needed to maintain operational readiness, reduce operating and support costs, and allow adaptation to innovative operational employment concepts.

The capabilities of the **Interim Force** must grow to reflect the characteristics of the Army Vision. To ensure the growth of interim force capabilities, AMD will evolve and improve its systems in a synchronized and integrated way that

exploits current and rapidly emerging technology while resourcing science and technology efforts to obtain leap-ahead capability. Efforts are ongoing to leverage investments in technological advancements such as developing a surface launched advanced medium-range air-to-air missile (SLAMRAAM) and a common THAAD/Patriot launcher. To further address transformation, AMD will simultaneously develop and sustain high-altitude to medium-altitude air defense (HIMAD) and short-range air defense (SHORAD) system-of-system packages in the AMD interim force.

The **Objective Force** will reflect the culmination of ongoing system improvements, new system capabilities, and state-of-the-art technologies. It will be modular, highly mobile, tailorable, and interoperable with Army forces, joint and multinational elements, and Interagency team members. It will be fully capable of proactively protecting these forces across the range of military operations. AMD objective research and development programs and initiatives will be structured to achieve this end. The introduction of THAAD, MEADS, EAADS, and JLENS will significantly improve protection of maneuver forces and other vital assets throughout a theater. MEADS will eventually replace Patriot, and EAADS will replace Stinger-based platforms. JLENS will provide elevated sensor capabilities that will complement joint fixed-wing assets and those of ground-based sensors.

AMD in the Army Objective Force will be substantially more capable and relevant than today's Air Defense Artillery. It will be a full spectrum force with special purpose capabilities and advanced strategic responsiveness, deployability, agility, versatility, lethality, survivability and sustainability to dominate, control, and exploit the joint aerial battlespace. AMD in the Army Objective Force will be a transformed force that will **See First, Understand First, Act First and Finish Decisively**—and empower the Army Objective Force to do likewise.

AMD Sees First to empower the joint, multinational and interagency forces to seize and maintain information superiority. AMD will See First by (1) disseminating fused sensor data to provide tailored situational awareness and focused early warning to at-risk forces; (2) deploying ground and elevated sensors to conduct extended range surveillance, and (3) conducting counter RSTA operations to deny the enemy aerial RSTA options.

AMD Understands First to empower the joint, multinational and interagency forces to aggressively shape the battlespace and set conditions for the fight. AMD will Understand First by (1) integrating into a

netted and distributed architecture to provide tailored situational awareness information for situational understanding; (2) fusing sensor data to create a scalable and filterable SIAP and COP for force-wide understanding of the battlespace; and (3) utilizing the SIAP and positive airspace control to dynamically control the airspace to eliminate fratricide and provide dynamic airspace utilization.

AMD Acts First to proactively protect the joint, multinational, and interagency forces and empower them to take decisive action at the times and places of their choosing. AMD will Act First by (1) providing situational understanding and focused early warning, providing tailored situational awareness and targeting information to supporting offensive operations; (2) conducting extended range surveillance and proactive protection to deny the enemy the ability to influence the operational area from the third dimension; (3) conducting positive airspace control to coordinate and synchronize users of the third dimension; and (4) employing FCSs with AMD capability and/or AMD FCS variants with active protection systems to counter direct and indirect fires.

AMD Finishes Decisively by deterring and destroying aerial threats to empower the leaders of the joint, multinational and interagency forces to win decisively and successfully transition to the next engagement. AMD will Finish Decisively by (1) achieving combat overmatch and destroying aerial threats to protect the force; (2) enabling C4ISR for integrated fire control; and (3) providing continuous tailored situational awareness and understanding for subsequent engagements.

Discussion of Key Equipment

Patriot

Description. Patriot is a corps and echelon above corps (EAC) AMD system that can simultaneously engage and destroy multiple targets at varying ranges and altitudes. It is the world's only battle-proven TMD system. The upgraded system Patriot Advanced Capability-3 (PAC-3) provides a remote launch capability; increases range, altitude, and firepower; and engages multiple maneuvering and non-maneuvering TBM and cruise missile threats. Additionally, a hit-to-kill missile is an integral part of this upgrade.

Operational Requirement. Patriot provides long-range, high-altitude AMD protection of corps and EAC ground forces and critical assets.

Program Status. PAC-3 Ground Support Equipment upgrades are in the procurement cycle. Upgrades to include the addition of medium and high-range resolution waveforms, a dual traveling wave tube, and a new exciter to the radar; upgrades to the battalion communications equipment; and the ability to remotely

locate launchers up to 30 kilometers from the radar. These changes will improve search, detection, track, and discrimination by the radar, increase battlespace, and improve communications. The PAC-3 missile is in Low Rate Initial Production. Developmental testing concluded in 1st Quarter FY02, with operational testing beginning in 2nd Quarter FY02. A Full Rate Production decision for the PAC-3 missile is expected during 4th Quarter FY02. Cost reduction initiatives are underway with the contractor to produce cost savings for additional PAC-3 missiles. Patriot also has a major recapitalization program. PAC-3 upgrades to counter projected threats, improve joint interoperability, and increase surveillance and detection capabilities are required. Currently, only 7 of 10 Active Component PATRIOT battalions are funded for upgrades to PAC-3, Configuration 3. Additionally, the PAC-3 missile inventory shortfall continues to be a challenge. The Army's requirement is 2,200 missiles with 1,130 funded.

Air and Missile Defense Planning and Control System (AMDPCS)

Description. AMDPCS is the C2 backbone of Army AMD and ensures the right air and missile defense at the right time and at the right place. AMDPCS fully automates C^4ISR, integrates AMD sensors, weapons and C^3I, and interfaces with ABCS, GCSS and Joint and Allied C^4I. It provides ADA Brigades with a fire control system via the Air Defense System Integrator (ADSI) for monitoring and controlling engagement operations by subordinate battalions. AMDPCS provides a common air and missile defense staff planning and battlespace situational awareness tool via the Air and Missile Defense Workstation (AMDWS), which gives the force airspace situational understanding. AMDWS also provides interoperability with Joint Theater Air and Missile Defense (JTAMD) forces. AMDPCS provides interoperability for Army AMD forces with the standard Army Battle Command Systems (ABCS) BMC4I, providing the air situation input to the Common Operational Picture.

Operational Requirement. AMDPCS integrates and automates the performance of command and control operations for Air Defense Artillery (ADA) Brigades, the Army Air and Missile Defense Commands (AAMDC), Corps and Echelons-Above-Corps headquarters, and Joint force command and control elements, such as the Battlefield Coordination Detachment. AMDPCS integrates and automates the performance of engagement/force operations at all echelons of command and provides interoperability with joint, combined, and/or interagency force partners.

Program Status. Program is in the procurement cycle with a 4QFY97

approved Operational Requirements Document. Major milestones: FY97 Approved as Acquisition Category III Program; 1QFY01 Delivered to first Initial/Interim Brigade Combat Team (IBCT); 3QFY01 Supported DCX-1; 3QFY01 Awarded contracts for design, integration, and fielding of the 263rd AAMDC; 4QFY01 ADSI Certified for TADIL A, TADIL B, and TADIL J message set implementation. Major Upcoming Activities: 2QFY02 Contract Award for Development of AMDPCS for First Digitized Corps; 3QFY02 2nd Interim Brigade Combat Team (IBCT) delivery; 3QFY02 Deployment of 263d SCARNG AAMDC tactical configuration. The FY 03-07 Plan currently funds (partially) the procurement necessary to upgrade and materiel release the currently fielded five brigade Amps and the 32nd AAMDC AMDPCS. Begins procurement for the 263d AAMDC and 111th AMD Brigade. Continues development of AMDWS software versions 2.0 through 4.0 and ADSI versions 11.0 and 12.0. Additional funding is required to provide modeling, simulation, analysis, and exercise support to III Corps and to upgrade computers and communication equipment. Software, models, and simulations must be developed to support III Corps. The computer and communication upgrades procure and replace obsolete hardware and software and prepare for the migration to future data radio systems.

Surface Launched Advanced Medium-Range Air-to-Air Missile (SLAMRAAM)

Description. SLAMRAAM is a heavy variant HMMWV-based launcher platform consisting of launch rails, launcher electronics and C^4 components. This system will be used to store, transport, erect, direct, and launch multiple AIM-120 AMRAAMs. It will provide a 20 times increase in the area coverage as compared to current Stinger based systems. This extension of the battlespace will ensure the Army's dominance and provide proactive protection for Interim Brigade Combat Team (IBCT)/Interim Division (IDIV) operations against current and future threats.

Operational Requirement. SLAMRAAM is a C-130 deployable AMD system that provides extended-range AMD against cruise missiles, UAVs, large-caliber rockets, helicopters, and fixed-wing aircraft in support of division and corps maneuver forces in tactical, homeland security, and asymmetrical environments. SLAMRAAM will possess a remote-launch capability and is a key element of the Army's Objective Extended Area Air Defense System (EAADS).) It will provide the Army's divisions with an AMD capability that will allow for simultaneous protection of maneuver forces, key civil/military infrastructure, population centers, and geo-political assets.

Program Status. Definition of science and technology activities and milestones are being developed at this time. SLAMRAAM is awaiting final approval of its operational requirements document and is partially funded through FY07.

Medium Extended Air Defense System (MEADS)

Description. MEADS is a corps and echelons above corps (EAC) AMD system that is scheduled to replace Patriot starting in FY 2012. It offers significant improvement in tactical mobility and strategic deployability as it requires 50% less airlift than Patriot. MEADS will provide continuous coverage alone or with SHORAD Systems in the corps/division area and will use a netted and distributed architecture and modularly-configurable battle elements, which allows it to interoperate with other airborne and ground-based sensors to provide a robust, 360 degree defense.

Operational Requirement. MEADS is a lower-tier AMD system that provides low to high-altitude air defense, theater ballistic missile defense, and cruise missile defense of the maneuvering force and fixed assets. It will synergistically operate with upper-tier, Corps, and Divisional AMD systems while improving lower-tier strategic responsiveness, deployability, agility and survivability.

Program Status. Program is in a risk-reduction effort which is designed to prepare for design and development, focus on technical risk areas, incorporate PAC-3 Missile into the MEADS architecture, achieve international cost and schedule consensus, and define program strategy. The FY03-07 Plan currently funds completion of the risk-reduction effort, including the development of prototype MEADS major end items, and the start of the design and development phase. Additional development and procurement programs will be required to ensure uninterrupted interoperability with Army and other service AMD systems. A phased pre-planned product improvement program will anticipate and maintain continuous overmatch against any emerging threat.

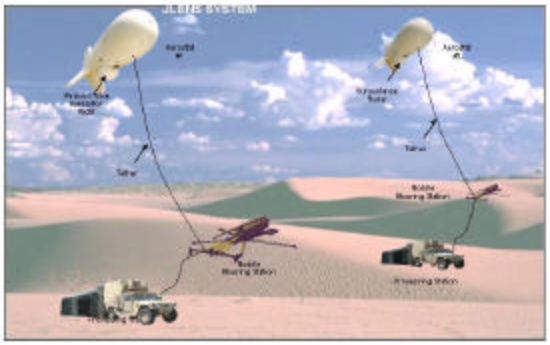
Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS)

Description. JLENS is a theater-based system using advanced sensor and networking technologies to provide wide-area surveillance and precision tracking of land attack cruise missiles. A joint program with Army lead, JLENS also performs as a multi-role platform to enable extended range C^2 linkages. A key element of the Army transformation Single Integrated Air Picture, JLENS integrates data from multiple sensors and C^3I networks and provides correlated data to BMC^4I nodes.

JLENS is less expensive to buy and operate than fixed wing aircraft and can stay aloft for up to 30 days, providing 24-

hour battle space coverage over extended areas.

Operational Requirement. JLENS provides over-the-horizon surveillance and precision track for broad area defense against land attack cruise missiles and also functions as a multi-



purpose aerial platform. JLENS is a key element for communication and range extension (information dominance) and also supports attack operations (ID battlefield targets). Primary missions include land attack cruise missile defense, single integrated air picture, surface moving target indicator and damage assessment. Secondary missions include tactical ballistic missile detection, ground intelligence, communication relay/retransmission, and battlefield awareness.

Program Status. Program is in the Concept and Technology Development (CTD) phase of its program life cycle. The program plans to provide a contingency deployable JLENS system [Precision Track Illuminating Radar (PTIR) and Surveillance Radar (SR) with a suite of communications equipment (EPLRS, JTIDS, CEC) elevated via aerostats each with its own processing station, mobile mooring station, and associated ground support equipment] by 4QFY08. First Unit Equipped is planned by 4QFY10. The FY03-07 Plan currently funds the design and development of the PTIR and associated SR risk reduction through CTD culminating in a Milestone B decision in 4QFY04. The program will then enter the System Development and Demonstration (SDD) phase to compete development of the SR and fabricate, integrate, and test the SR with the PTIR to have a complete system by 4QFY08. Upon completion of DT by 4QFY08, a Milestone C decision is planned for 1QFY09 to allow the program to enter production. The JLENS program is currently funded to develop, build and test the PTIR by 4QFY07. Additional funding is required to design, develop, fabricate, integrate and test the SR and system aspects to provide and contingency deploy a robust, highly capable JLENS System. Production of the JLENS System is not currently funded for the FY09-FY16 period.

Sentinel

Description. Sentinel is a trailer-mounted radar system that detects, tracks, classifies and identifies cruise missiles, UAVs, helicopters, and fixed-wing aircraft to cue SHORAD weapons. It is employed in the division and corps area. Data is fed through the FAAD C2 to

SHORAD weapons to provide air situational awareness to the supported force in the forward area. The system is C-130 deployable. The Sentinel consists of a radar-based sensor system with its High Mobility Multi-purpose Wheeled Vehicle (HMMWV) prime mover, power, IFF, and Command and Control interfaces. The Antenna/Transceiver Group consists of an advanced three-dimensional battlefield air defense radar housed aboard a High Mobility Trailer (HMT) chassis. The radar employs a modern phased array antenna that automatically detects, tracks, classifies, identifies, and reports targets. Targets can be hovering to fast moving, and from the nap of the earth to the maximum engagement altitude of SHORAD weapons. The radar operates at X-band, transmitting a pencil beam. It rotates at 30 rpm (2 second update). The instrumented range and altitude are 40 kilometers and 4 kilometers, respectively. The Sentinel data utilizes SINCGARS AN/VRC-92A and EPLRS AN/VSQ-2 radios. These can provide a track file of more than 60 targets.

Operational Requirement. Sentinel provides acquisition, tracking, classification, target location, and identification of cruise missiles, UAVs, helicopters, and fixed-wing aircraft to cue SHORAD weapons into field of view. Sentinel provides air situational awareness to the supported force in the forward area. The AN/MPQ-64 Sentinel radar is the Army's prime contributor of air picture data for Short Range Air Defense (SHORAD) weapons. It provides digitized battlefield information for force protection from hostile air attack, reconnaissance, surveillance, targeting, and acquisition and assists in the prevention of fratricide. It is highly accurate and acquires targets sufficiently forward of the Forward Line of Own Troops to improve SHORAD weapon reaction time and allow engagement at optimum ranges.

Program Status. Program completed its primary procurement of Sentinel radars in FY01 and is currently undergoing a P3I program to improve its surveillance and tracking capabilities. Units to be fielded in FY02 include 2nd ACR, 3-265th ADA (FLARNG), and 2-174th ADA (OHARNG). Additional upgrades and systems modifications are currently scheduled through FY08 for many AC and RC units in order to take advantage of advances in technology and SW upgrades. The FY03-07 Plan currently funds procurement of 88 Enhanced Target, Range, and Classification (ETRAC) modifications to the radar. There are two upgrades planned for the Sentinel fleet: Phase 1A improves the radar detection range against low observable and stealthy targets; Phase 1B improves the radar classification of low observable and stealthy targets at extended ranges. The Sentinel Phase IB capability for target airframe classification will support the joint identification and target classification function that allows SHORAD weapons to operate at maximum effectiveness.

AMD Summary

Although development of AMD programs to meet the needs of the Legacy, Interim, and Objective Forces are presently constrained by limited quantities, technologies, or available funding, AMD

modernization is on track to meet Army Transformation requirements.

While budget constraints will impact the speed at which we develop and field many of the AMD initiatives, current resources available are being focused on those capabilities that are time-critical and that provide the greatest benefits to the force. To ensure effective balance, AMD modernization remains closely synchronized with other Joint Theater Air and Missile Defense (JTAMD) elements to provide effective Full Dimensional Protection of the US Homeland and Army Legacy, Interim, and Objective Forces. High-priority ARNG AMD units have been and will continue to be modernized as new systems are fielded. Conversely, lower-priority ARNG AMD units cannot be modernized at this time due to current funding constraints.

The Ground-based Midcourse (GMD) System is the successor to the National Missile Defense (NMD) system. The GMD system will have the capability to engage ICBMs, potentially armed with weapons of mass destruction, at altitudes that mitigate or negate their effects. GMD will implicitly support Army Transformation, ensuring Army force responsiveness by protecting our ability to mobilize and project power.

Nuclear, Biological, and Chemical Defense

Overview

Nuclear, Biological, and Chemical (NBC) systems provide the Army with the enabling technologies of NBC defense, smoke and obscurants to fully achieve force protection, Information Dominance, and Full Dimensional Protection in a Weapons of Mass Destruction (WMD) environment. The Army's NBC defense strategy is to employ "focused defense" against NBC threats so that only units directly affected by the hazard would be warned to take protective measures. Using focused defense, large numbers of units will no longer assume a full protective posture as a precautionary measure. Focused defense allows units to operate in the lowest required protective posture without unacceptably increasing the risk to soldiers. The Army's obscuration strategy is to deny the threat's use of the electromagnetic spectrum while preserving our ability to exploit it at will.

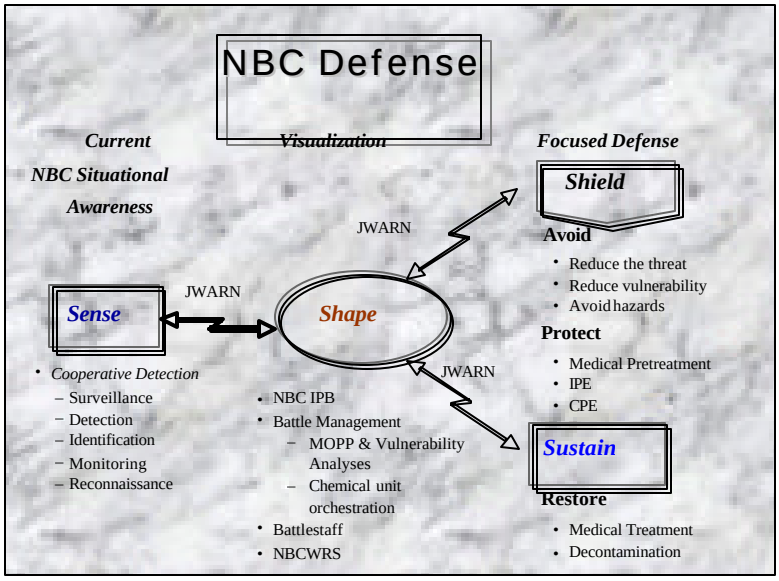
In addition to providing the means of general NBC defense and obscuration common to all units, the Army provides increased NBC defense and obscuration capability with specialized Chemical units. NBC reconnaissance and surveillance units, with their point and standoff detectors, are the principal means of contamination avoidance. Decontamination units restore combat power after units are contaminated. Biological detection companies provide shortened response time for divisions and corps to initiate their medical response to the growing threat of biological warfare agents. Information dominance is supported through development of obscurants that are effective in the visual, infrared, and millimeter ranges.

The NBC defense mission area also includes the Army's efforts to address Homeland Security. Today, the nation is beginning to understand that CONUS

installations and power projection platforms are no longer a sanctuary. The very ability to execute our force projection strategy requires NBC-focused defense over strategic forces and means from pre-mobilization through conflict termination.

NBC Modernization in Support of Army Transformation

Chemical Vision 2010 is the implementing vision of the Army's NBC defense modernization effort. It enables the commander to minimize casualties and preserve combat power in an NBC environment and to create information superiority by using obscurants. Operationally, if the enemy has an offensive NBC capability, our primary goal is to deter threat use. If deterrence fails, our mission is to defend against an NBC attack with minimal casualties and degradation, allowing commanders to quickly restore full combat power and continue their mission across the full spectrum of operating environments.



The principles of NBC Defense in *Chemical Vision* are sense, shape, shield, and sustain. The principles of obscuration are sense, shape, shield, attack, and deceive. These principles support the patterns of operations in *Army Vision 2010* (Protect the Force and Information Dominance) and the principles in *Joint Vision 2020* (Full Dimensional Protection and Information Operations).

In providing the NBC defense and obscuration systems for the Army's transformation strategy, the Army will equip its specialized Chemical units and provide NBC defense and obscuration items common to all units in accordance with the three tenets of the Army's overall modernization strategy (1) focusing its Science and Technology efforts on the objective force, (2) meeting immediate operational needs in the interim force, and (3) maintaining and improving the warfighting capabilities of the legacy force through a judicious combination of selected modernization, recapitalization, and sustained maintenance of legacy, but still essential, systems. The following paragraphs will elaborate on just some of the key NBC systems in the Army's modernization plans, realizing there are numerous additional NBC systems in development.

Homeland Security and Chemical, Biological, Radiological and Nuclear (CBRN) Force Protection

The attacks that occurred on 11 September 2001 clearly demonstrated that the United States is no longer a sanctuary. While the terrorist chose the Pentagon because it symbolizes America's military hegemony, any number of military installations around the country could have been attacked. U.S. Army installations that host initial entry forces, power projection platforms, critical training infrastructure, and force headquarters are high value targets and must be safeguarded.

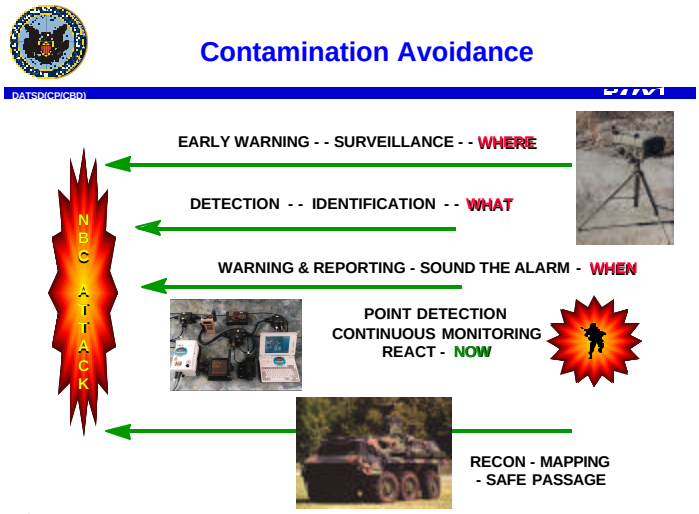
Furthermore, terrorists are no longer limited to high yield explosives such as the one that destroyed the federal building in Oklahoma City. Due to the proliferation of knowledge, technology, and materiel, terrorists are able to employ chemical, biological, radiological (including toxic industrial materials), and possibly nuclear weapons against civilian and military targets in the United States and abroad. Many hazardous chemicals such as ammonia, chlorine, and sulfuric acid are available and can be purchased in a free market society. Biological agents such as anthrax and ricin are easily produced and dispersed.

To protect critical military infrastructure from the effects CBRN weapons in the contemporary operational environment, the Chemical Corps must design and equip new organizations appropriate for responding to the employment of chemical, biological, radiological, and nuclear weapons against U.S. facilities. The CBRN Installation Support Team (IST) will provide an installation commander with a first responder capability. However, due to its limited capabilities and potential need for supporting extended operations, a requirement for more robust teams capable of reinforcing the CBRN-IST exists. These strategically and regionally located CBRN Rapid Response Teams (RRT) will work in conjunction with the regional Medical Command (MEDCOM) Special Medical Augmentation Response Teams–Nuclear, Biological, and Chemical (SMART-NBC) and will provide the commander with the required assets to respond to and mitigate the effects of weapons of mass destruction may have on the installation or local community.

The CBRN-IST is a "matrixed" organization that provides an Installation Commander an organic CBRN response capability. The CBRN-IST reports directly to the Installation Commander and conducts operations in support of the installation anti-terrorism/force protection plan. The CBRN-IST performs chemical, biological, and radiological detection, warning and reporting, and limited decontamination operations, triage and emergency procedures on an installation to minimize casualties and limit the spread of contamination.

The CBRN-RRT provides a MACOM Commander with a full-time, dedicated capability to rapidly augment and reinforce installations following a CBRN incident. The CBRN-RRT is under the operational control (OPCON) of the Incident Commander. The CBRN-RRT pre-positions/deploys to an incident site to augment a CBRN-IST, assess hazards, and advise the Installation Commander/Incident Commander in order to minimize casualties, limit the

spread of contamination, and facilitate restoration operations. It works closely with MEDCOM SMARTs. The CBRN-RRT does not replace the installation's CBRN-IST's ability to respond, but enables the CBRN-IST to sustain operations up to 48 hours. Upon arrival at an incident site, both the CBRN-RRT and a MEDCOM SMART Team integrate with the CBRN-IST and continue supporting CBRN force protection operations.



Finally, the CBRN-RRT begins coordinating remediation operations to restore the installation to fully mission capable.

Before the CBRN-IST and CBRN-RRT can protect U.S. Army installations, each team will receive a CBRN Response Set. Each set will contain both military and civilian-off-the-shelf (COTS) equipment. Equipment such as Level A Suits, Self-containing Breathing Apparatus (SCBA), Portable Biological Aerosol Sampler (PBAS), radiac meters, and portable mass spectrometers will not only protect personnel from the effects of chemical, biological, and radiological hazards, but enable them to detect, identify, and sample the hazards too. In addition to the equipment, all teams will receive the doctrine, training, and certification required.

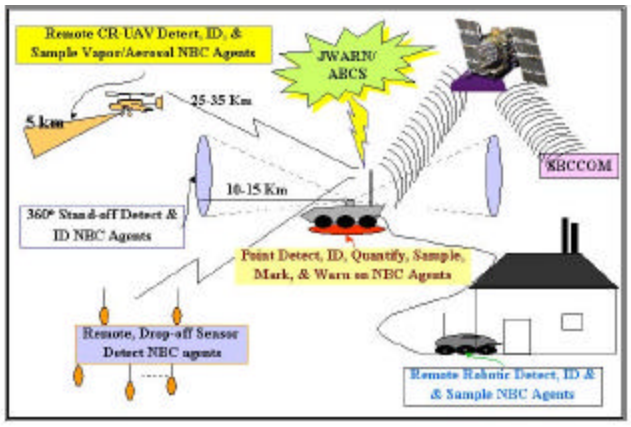
Contamination Avoidance

Sensing is key to avoid contamination, take protective action, and restore combat power. The goal of sensing is to develop a cooperative detection system that interfaces with current Command, Control, Communications, Computers, Intelligence (C4I) networks and future Battle Management Systems. The cooperative detection system consists of NBC surveillance, detection, identification, monitoring, and reconnaissance elements operating on the existing Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) architecture and feeds into the NBC Battle Management System. By 2010 and beyond, as both sensor technology and the network mature, sensors will be integrated onto all battlefield systems across all services. These will be smart sensors that detect, identify and warn of all NBC and TIM threats and can be rapidly programmed for new threats as they are developed and used by the adversary.

Converging Reconnaissance Requirements

There will be a converging of NBC reconnaissance from the separate systems such as the NBC Reconnaissance System (M93 series, commonly called Fox), the biological surveillance (M31 series Biological

Integrated Detection System (BIDS)), and the Light Nuclear Biological Chemical Reconnaissance System (LNBCRS), into a single platform for the Objective Force based on the Interim Armored Vehicle-NBC Reconnaissance System. Current developments, such as the Joint Biological Point Detection System (JBPDS), the Chemical Biological Mass Spectrometer (CBMS), the Short Range Biological Standoff Detection System (SRBSDS), and NBC sensing packages for Unmanned Ground Vehicles and



Unmanned Aerial Vehicles will contribute key capabilities to meeting the needs of the Objective Force.

In accordance with the Army's Transformation Strategy for the Interim Force's IBCT, the Interim Armored Vehicle-Nuclear Biological Chemical Reconnaissance System (IAV-NBCRS) will be based on IBCT operational requirements. The IAV-NBCRS will have surveillance, detection, identification, monitoring, and reconnaissance capabilities. The IAV-NBCRS will also meet lethality, tempo, survivability, and sustainability requirements. The IAV-NBCRS will contain radiation, point biological and chemical, and standoff chemical detection systems integrated into one platform, as well as leverage UAV assets within the IBCT for aerial NBC reconnaissance. IAV-NBCRS will be organized into a three vehicle platoon organic to the Reconnaissance Surveillance Target Acquisition (RSTA) squadron of the IBCT.

Protection

Protecting the force from NBC hazards is critical to the success of Army in any battlespace, with the goal of providing Army units the ability to fight and win in a contaminated battlespace. Recent and near-term individual protection developments are producing lightweight, durable protective clothing and masks that are compatible with existing and near-term weapons systems. These new technologies allow for a much lighter burden on the logistics system by increasing the wear life of the suits by 50% (from 30 to 45 days) thus substantially decreasing the demand for sustainment stocks. The Army will begin replacing its current M40 series of protective masks beginning in FY 05 with the next generation mask, the XM 50 Joint Service General Purpose Mask (JSGPM). At the same time the Army will have completed its transition from its current Battle Dress Overgarment (BDO) to the new Joint Service Lightweight Suit Technology (JSLIST) suits, and move to a NBC-Soldier Hydration System for improved capability under NBC conditions. Collective protection will improve for medical units with the fielding of the Chemically

Protected Deployable Medical System (CPDEPMEDS) and the Chemical Biological Protective Shelter (CBPS) at the battalion level. Collective protection for the IAV will consist of a ventilated facepiece system.

Decontamination

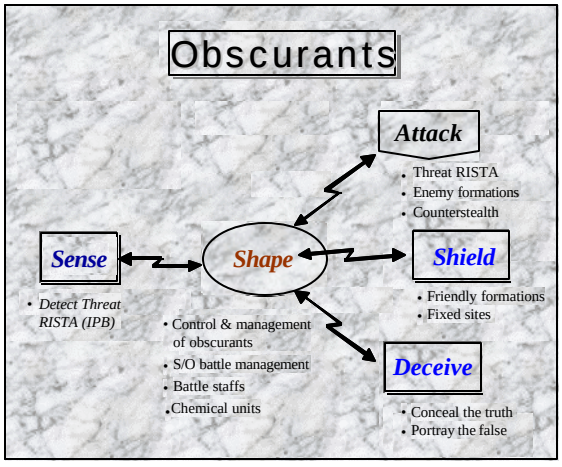
The ability of U.S. Forces to conduct decontamination is an essential component of force protection. Today's Army must be prepared to fight in a contaminated environment. Having the capability to remove, neutralize, or destroy such contamination is a key component in restoring the combat power of units.

Lessons learned from the past show that current decontamination methods and capabilities are inadequate to keep pace with the Army transformation. Units must be able to decontaminate faster, more effectively, with minimum amounts of water and without damaging sensitive equipment while sustaining operations Developing decontaminants, delivery apparatus, and doctrine are ongoing efforts that will help to ensure survivability in contaminated environments.

The future decontamination system concept is to be capable of conducting thorough, fixed site and terrain decontamination operations with the same equipment and decontamination on the move. Using the HEMTT-Load Handling System/Decon provides for a common platform and reduced logistical footprint while facilitating critical NBC Decon operations in complex and/or restrictive terrain.

For the Legacy Force, existing M17 Lightweight Decontamination Systems (LDS) will be maintained. Chemical Corps dual-purpose (smoke/decon) units will be equipped with the Modular Decon System (MDS). The Objective Force will be equipped with the new decontaminants and applicators that ultimately are selected from the Joint Sensitive Equipment Decontamination (JSSED) program and the Joint Fixed Site Decontamination (JSFXD) program such as HEMTT-LHS/Decon.

Obscuration



With the rapid proliferation of advanced target acquisition systems and advanced weapons, the commander must not only protect his situational awareness, but also

degrade the adversary's capability. The five principles for obscurants found within the Chemical Corps Vision of “Sense, Shape, Shield, Attack and Deceive” provide the framework to degrade an adversary’s situation awareness. Obscurants support the war fighter by providing him with a capability that allows him to attack an enemy’s target acquisition systems across the electromagnetic spectrum.

Smoke systems for the Legacy Force, providing visual and IR smokes only, will remain with the current M56 motorized smoke system (HMMWV mounted). A Millimeter Wave (MMW) capability is programmed for the M56 in both the Legacy and Objective force. For the mechanized units of the Legacy Force the current M58 (M113A3 mounted) smoke system will be maintained but is not funded to provide an MMW capability. Addition of the MMW capability for the M58 is an unfunded requirement to support both the Legacy and Objective Forces. Obscurants for the interim force IAV will consist of a rapid multi-spectral self-obscuration grenade system.

Discussion of Key Equipment

M93/M93A1 Nuclear Biological Chemical Reconnaissance System (Fox)

Description. The Nuclear, Biological and Chemical Reconnaissance System (NBCRS)–Fox Block I Modification (M93A1) contains an enhanced NBC sensor suite consisting of the M21 Remote Sensing Chemical Agent Alarm (RSCAAL), MM1 Mobile Mass Spectrometer, Chemical Agent Monitor/ Improved Chemical Agent Monitor (CAM/ICAM), AN/VDR-2 Beta Radiac, and M22 Automatic Chemical Agent Detector/Alarm (ACADA). The NBC sensor suite has been digitally linked with the communications and navigation subsystems by a dual-purpose central processor system known as the Multipurpose Integrated Chemical Agent Detector (MICAD). The MICAD processor fully automates NBC warning and reporting functions and provides the crew commander with full situational awareness of the Fox’s NBC sensors, navigation, and communications systems. The M93A1 Fox is also equipped with an advanced navigation system Global Positioning System (GPS) and Autonomous Navigation System (ANAV) that enables the system to accurately locate and report agent contamination. The mobility platform is a six-wheeled, all-wheel-drive armored vehicle capable of cross-country operation at speeds up to sixty-five mph. The Fox System is fully amphibious with swimming speeds up to six mph. As a reconnaissance vehicle, it can locate, identify, and mark chemical/biological agents on the battlefield. The Fox usually accompanies the scouts or motorized reconnaissance forces when performing its NBC mission. It has an over-pressure filtration system that permits the crew to operate the

system in a shirt-sleeve environment that is fully protected from the effects of NBC agents and contamination. The M93A1 system is operated by a three-person crew (legacy systems require a four-person crew). The M93A1 will be one of the few systems fielded with a fully interactive class 4/5 electronic technical manual (IETM).

Operational Requirement. Detect, identify, and mark areas of nuclear and chemical contamination; sample for nuclear, biological, and chemical (NBC) contamination; and report accurate information to supported commanders in real time.

Program Status. 1QFY99 First unit equipped. Remaining systems scheduled for conversion and fielding through 4th qtr FY 03.

M31/M31A1 Biological Integrated Detection System (BIDS)

Description. The BIDS consists of a shelter mounted on a dedicated vehicle (M1097A1 HMMWV) and equipped with a biological detection suite employing complementary technologies to detect large area biological attacks. It can detect all types of BW agents in less than 10 minutes, and identify any 8 agents simultaneously in less than 30 minutes.

Operational Requirement. As an Army Corps level asset, the BIDS mitigates the effects of large-area biological attacks during all phases of a campaign. Individual BIDS systems are employed throughout the Corps area to create a sensor array/network. The BIDS network is used for warning and confirming that a Biological Warfare (BW) attack has occurred and will provide a presumptive identification of the BW agent being used.

Program Status. The NDI version of the BIDS has been fielded to the 310th Chemical Company (Reserve) and the P3I version has been fielded to the 7th Chemical Company (Bio).

M17 Lightweight Decontamination System (LDS)

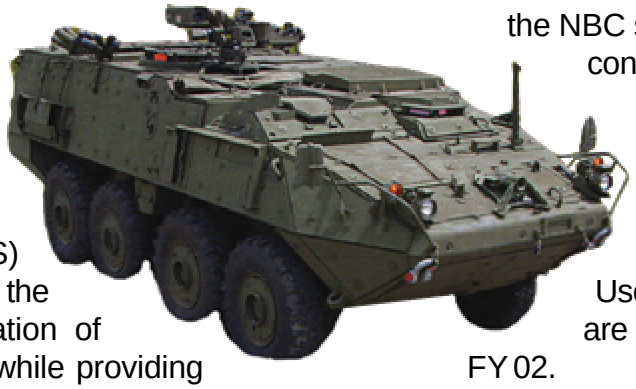
Description. The M17 system includes a pumper/heater module, an accessory box and a 3000 gallon rubberized fabric, collapsible water tank.

Operational Requirement. The M17 is used for hasty or deliberate equipment decontamination at the battalion level.

Program Status. Fielding complete.

Interim Armored Vehicle- NBCRS

Description. The IAV-NBCRS will incorporate the Block II NBCRS integrated chemical and biological point detectors that will allow on-the-move standoff biological and chemical agent detection. The Chemical Biological Mass Spectrometer (CBMS) Block II will improve the detection and identification of liquid chemical agents while providing a first-time biological agent detection capability to the reconnaissance platform. The Block II sensor suite will automatically integrate contamination information with data from on-board navigation and meteorological systems and rapidly transmit contamination hazard and clear area intelligence to the appropriate operations center. Integration of the common NBC technical architecture will allow for expansion/upgrading of the on-board computers at minimal cost, as well as the command and control of NBC sensing Unmanned Aerial Vehicles and Unmanned Ground Vehicles in the Objective Force System.



Operational Requirement. The IBCT will potentially operate in a nuclear, chemical, and biological environment, which could include weaponized agents, toxic industrial hazards, and battlefield residues. The IAV-NBCRS must be capable of hosting existing and planned NBC detection capabilities to enable Army Divisions to dominate across the full spectrum of operations.

Program Status. The IAV-NBCRS development program completed the critical design review (CDR) for the NBC Sensor Suite in Sep 00. Hardware procurement and software coding has been initiated. A demonstration of the NBC sensor suite was conducted in Apr 01. Engineering Development Test (EDT) and Limited User Test (LUT) are planned for FY 02. Milestone C is scheduled for 1st Quarter FY 03 and will allow the start of low rate initial production (LRIP). Production Verification Testing (PVT) and Initial Operational Test and Evaluation (IOT&E) are planned for FY03/04.

Summary

Among the significant changes to the future strategic environment, proliferation of WMD is recognized as a principal asymmetric threat capable of providing an adversary military advantage to neutralize overwhelming conventional superiority. Having an effective NBC defense is a necessary component of any defense strategy that seeks to demonstrate to the adversary that use of WMD will not gain the advantage sought. Modernizing the force while conducting a robust S&T effort is critical to preventing technological surprise from new Chemical/Biological (CB) agents or different employment means. Recapitalizing and maintaining the current force is necessary to enable Transformation and mitigates risk by extending the useful life of current

systems within fiscal constraints. This modernization plan assures a disciplined approach to meeting mission-based requirements and secures orderly change as we transition to the Objective Force.

Nevertheless, although significant and measurable progress has been made to enhance survivability and sustain operations after an NBC attack, current fiscal constraints have inhibited our ability to establish and maintain information superiority by countering an adversary's reconnaissance surveillance, and target acquisition sensors. Unless additional resources are provided, we will not be able to take full advantage of our ability to obscure battlefield sensors operating in the millimeter wave region of the electromagnetic spectrum. This capability must be included in both the Legacy and Objective Forces as we transform from platform survivability to force survivability.